

February 18, 2005

Dear Madam,

These attached papers were sent to me, a Retired former worker at the Paducah Gaseous Diffusion Plant. Many of these things were discussed with both present and past employees at a meeting in 1999 with the Secretary of Energy at the time, Bill Richardson.

There is contained in these documents much information we were never told about. I feel it would be of benefit to you to be aware of this information

Respectfully Yours,

Jim Chesnut

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It would be a grave injustice to the workers at the PGDP if the recent letter by \_\_\_\_\_ were to remain unchallenged. \_\_\_\_\_ was the head of the plant health protection group for nearly all of the first \_\_\_\_\_ years of operation. He is maintaining, despite the overwhelming body of evidence to the contrary emerging since 1999, that the health of the workers was adequately protected on his watch.

I am authoring a book on the PGDP based on \_\_\_\_\_ memoirs (interviews with \_\_\_\_\_ who worked in C-400 for 39 years, have been prevalent in the press) and have been researching the topic for several years. Although perhaps not succinctly summarized in one place, the evidence has been clearly laid out for all who care to read about it, both in the press (Paducah Sun, Louisville Courier-Journal and Washington Post) and in the DOE's investigative reports (Mass Balance<sup>1</sup> and Exposure Assessment<sup>2</sup>) which are generally available.

The main issue is protection of the workers from the highly radioactive and dangerous transuranics (neptunium and plutonium) present in the recycled uranium processed by the plant. Neptunium is 2,100 and plutonium is 100,000 times as radioactive as uranium. Right from the very beginning, the AEC warned the plants (Paducah, Oak Ridge and Portsmouth) that the recycled uranium contained plutonium which would be a hazard if it were to concentrate in the plant processes. A 6-page March 1952 AEC memo noted that, if the plutonium built up, special safeguards would be needed such as isolation of contaminated work areas, regular workspace monitoring, required use of respirators and hand counters, special dedicated clothing, and requiring workers to wash their hands and check for contamination prior to eating, smoking or leaving work.<sup>3</sup>

It wasn't long before the plant discovered that the transuranics were indeed building up in the processes and the workers were being exposed. The Exposure Assessment report notes that ash handlers tested positive for plutonium as early as 1953 and in 1957 it was found that the plant equipment was grossly contaminated with neptunium. The plant began discussing this "neptunium problem" with the AEC. A 1960 memo from AEC scientists noted that 300 workers were likely exposed and needed to be tested, but it was the policy of the PGDP that the testing not be done because it would alert the workers to the problem and they would demand hazardous duty pay<sup>4</sup> (ultimately it all came down to money). What has not been widely reported in the press is that this memo went on to say that the next best thing was to obtain and test the dead worker's bodies<sup>5</sup> (eventually there were plenty of these).

Key processes where the transuranics built up to dangerous levels included in the ash receivers from the fluorination towers in C-410, in the cylinder heels that were processed in C-400 and in the "Paducah Dust" which built up in the cascade equipment (these were dismantled in C-400 and C-720 during the perpetual cascade improvement programs).

As described in the Exposure Assessment report, a plant health physics report from 1981 describes how the radiation levels in the ash receivers have been increasing and now range up to 105 Rad/hour at 1 foot due to the high levels of transuranics and uranium daughters (another hazard that built up and the workers were never told about). This radiation level would exceed the 3-month plant limit in less than 5 minutes of exposure!

Prior to the C-410 feed plant being shut down in 1977, the ash was pulverized in C-400 and recycled right back to the fluorination towers in C-410 to salvage any uranium present, thus facilitating the buildup of transuranics over the years. After 1977 there were several hundred ash receivers stored at the plant and,

<sup>1</sup> *Recycled Uranium Mass Balance Project Paducah Gaseous Diffusion Plant Site Report*, U.S. Department of Energy Report BJC/PGDP-167 (prepared by Bechtel Jacobs), June, 2000

<sup>2</sup> *Exposure Assessment Project at The Paducah Gaseous Diffusion Plant*, U.S. Department of Energy Report (prepared by the University of Utah and PACE Union), December, 2000

<sup>3</sup> *1952 Memo Cited Plutonium Danger*, Paducah Sun, September 22, 1999

<sup>4</sup> *Uranium Plant Risks Were Concealed*, Washington Post, September 21, 1999

<sup>5</sup> *Neptunium at Plant as Early as '57*, Paducah Sun, September 15, 1999

over a period of years, this ash was pulverized at C-400 and shipped to FPMC in Fernald Ohio. A 1980 shipment of the ash caused quite a stir when it was tested at Fernald and found to contain 7757 ppb of plutonium (770 times the level that DOE considered safe to handle without protection and training).<sup>6</sup> This triggered a 1985 DOE investigation and a lawsuit by the Fernald workers who alleged that they had worked with the ash for several years and were not told of the danger. In 1994 DOE settled with the Fernald workers for \$15 million and lifetime medical but word never got back to the Paducah workers.

In response to the DOE investigation, Martin Marietta sponsored a study by IT Corp. Completed in 1992, this study engendered "serious concerns" by the experts from the University of Utah who prepared the Exposure Assessment report. The PGDP processed the recycle uranium before 1977 but the IT Corp study used only air and worker urinalysis data from the 80's (when recycle uranium was not being processed) and fecal data from workers hired after the mid 70s. In what was essentially a whitewash, the study concluded that "the overall exposure potential from transuranics for Paducah workers is not significant". The Mass Balance report says that neptunium levels in the ash ranged up to 25,600 ppb. So the plutonium (1,300 times) and neptunium (>100 times) were significantly concentrated in the ash above what was in the feed.

Likewise the transuranic (and uranium daughter) levels built up in the cylinder heels and created dangerous radiation levels. The only overexposures ever documented at the plant occurred in 1968 at C-400 from radiation in the heels. Health physics reports document radiation levels up to 10 Rad/hour at 1 foot in the heels (would exceed the 3-month plant limit in about 30 minutes). In fact there was a plant program for several years to recover the neptunium from the cylinder heels in C-400 (Harold worked on this and no special safety precautions were taken). Oak Ridge testing found neptunium in the urine of the recovery workers. The Mass Balance report says that the concentrations of plutonium and neptunium ranged up 100,000 and 25,000,000 ppb respectively in the recovery operations in C-400 (concentration factors of 16,700 and 100,000 versus the feed).

The Mass Balance report describes a series of seven plant health physics reports dating from 1959 to 1980 relating to disassembly of the cascade equipment. These reports document the dangerous levels of radiation and transuranics (and uranium daughters) that built up in these components and came flying out when they were dismantled using air impact wrenches. For example in the 1980 report, air samples taken during disassembly exceeded the plant limits by factors of 1,680 for uranium and 2,212 for neptunium. The reports also document that respirator use on these jobs remained relatively lax throughout these two decades. Lax respirator use was confirmed in that in the first half of 1978, 20 of the 29 workers with urine uranium exposure levels exceeding the plant investigation level were involved in the upgrade work.

Basically, it is a pain to wear a respirator and people are not going to do it unless it is strongly emphasized that a specific hazard makes it imperative. These health physics reports claimed that respirators were required on the disassembly work but \_\_\_\_\_ says that they were not, at least in C-400, and this is echoed by other workers. The Mass Balance report recognizes this discrepancy and notes the following finding by the DOE Phase II investigation in 1999: "While contamination control practices were desirable, these practices were neither rigorously enforced nor mandatory during the early years of PGDP operations. There is evidence that as late as 1973, guidance to employees allowed workers to choose whether to use a respirator, and what type, based on their perception of odor or visible fumes in the work area."

The Mass Balance report notes that the Paducah Dust had up to 2,740 ppb of plutonium (457 times) and up to 3,220,000 ppb of plutonium (12,300 times concentration).

At the same time these levels of radioactivity and transuranics were building up to very dangerous levels, the plant was essentially brainwashing the workers about the safety of the materials they were handling. The press interviews have been filled with worker quotes: they told us it was safe enough to eat; told us we would get no more radiation than from a watch, an x-ray, the sun or a plane ride; I saw my supervisor

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<sup>6</sup> '85 Report Urged Uranium Worker Test, Louisville Courier-Journal, September 18, 1999

salt his bread with it; my supervisor ate some; if you get dosed up just drink a few beers to wash it out; etc. The plant spread uranium on the lawns and used it to deice the roads. Workers wore their own clothing on many operations jobs (C-340 and component disassembly). Studies were even conducted where plant employees ate, drank and breathed uranium to demonstrate how safe it was.<sup>7</sup>

In shocking opposition to the 1952 AEC instructions, health physics memos were issued instructing workers that there was no need to wash their hands before eating (1957), that smoking with contaminated hands was not a problem (1957) and that it was okay to wear your personal clothing except on very contaminated jobs (1967) (Mass Balance report). The memo about smoking also contained the statement that "Animal feeding experiments showed that insoluble compounds of uranium may be ingested in relatively large amounts without hazard." Additionally it contained a statement that studies injecting uranium under the skin had also shown no hazard. After these memos came out, \_\_\_\_\_ says that the safety equipment (hand counters, gamma graph and hot change house) was torn out of C-400, "as if there was no hazard with anything we would be working with from then on".

The worker protection program was primarily based on radiation badges and uranium urinalysis. There are numerous worker quotes regarding doubts about the film badges. They would be placed in the ash receivers, etc. and nothing ever came of it. Except for the 1968 exposure in C-400, there were no reported radiation overexposures in plant history. However, the levels of radiation in the certain areas make this difficult to believe. Based on the information, the most likely explanation is what is noted in the Mass Balance report "several workers reported that high badge readings were discarded". A health physics worker hired at PGDP in the 90s testified to congress that he worked in a contaminated area for a month and yet his badge reading was zero and he believes that plant management altered his and other workers records over the years to conceal the truth.<sup>8</sup> Concealing problematic data was not uncommon at the plant. The Exposure Assessment report notes that "health physics air sampling reports from 1961 to 1977 often stated that maximum values were not included in the reported averages" and they found numerous instances of high urinalysis results in specific reports on incidents and releases that were not reported in the electronic data base. (Of course there were years of denial about any knowledge of how plutonium could be in deer and well water and then in 2000 maps surfaced, dating back to 1988, which showed high plutonium levels around the plant.)

Using uranium urinalysis to control exposure to transuranics is absolutely invalid. While uranium passes through the body fairly rapidly (days), the more radioactive transuranics stay in the body much longer and deposit to the bone. The half life for neptunium in the body is 75 years. This may not have been known at the time, but any legitimate health physics program should have considered the possibility. The 1999 DOE audit of the plant concluded that "Paducah Health Physics staff knew that traditional uranium controls would not be sufficient for areas where neptunium would concentrate". (Mass Balance report)

Beyond this, there was an early problem with workers frequently exceeding plant uranium urinalysis limits and so, unbelievably, the plant restriction limit was increased from 10 to 100 ppb in 1956 and in 1962 was raised to 870 ppb! (Exposure Assessment report) Further the recycled uranium could not meet the plant limits for transuranics and so these were increased in 1967 from 95 to 950 ppb for neptunium and 4 to 10 ppb for plutonium (Exposure Assessment report). Nearly all of the neptunium lot results reported in the Mass Balance report fail the 95 ppb limit, although none fail 950 ppb. Many of the plutonium lot results reported in the Mass Balance report fail the 4 ppb limit and about 10% still fail the 10 ppb limit (including one up to 23 ppb, they weren't paying attention to them anyway).

The transuranic contamination was not contained in the plant operations areas. The plant released 66 tons of UF<sub>6</sub> to the atmosphere prior to 1990. That works out to be 9¼ pounds per day every day for 38 years! (NRC shut Honeywell-Metropolis down for 4 months after a single 7-pound release in December 2003.) It also included transuranics. The Mass Balance report notes that 210 grams of plutonium and 14.1 kilograms of neptunium are "assumed lost to environment (releases, burial and liquid discharges)". When a thorough survey of the plant was conducted in the 90s, radioactive contamination was discovered

<sup>7</sup> *Paducah Workers Used in Uranium Experiments*, Louisville Courier-Journal, February 6, 2000

<sup>8</sup> *Beginning of an Ugly Story*, Paducah Sun, September 23, 1999

on the roads and lawns, in the cafeteria and break rooms, and in the plant auditorium. Around 1990, \_\_\_\_\_ was told that some suspicious results were seen with his urinalysis but that the results were being invalidated because secretaries and other non-operations personnel had also tested positive (the word plutonium was never mentioned but it turned out to be that). Because of the shoddy contamination control, it is likely that everyone who worked at the plant (and the neighbors) had some exposure. The Mass Balance report notes that a 1999 DOE audit of the plant concluded that "contamination control practices were lax at Paducah from the beginning of plant operations until the 1980's, use of personal protective equipment was inconsistent and it appears that the majority of the transuranics and Tc-99 introduced to the Paducah plant in the recycled uranium was inadvertently released to the environment."

The Exposure Assessment report notes there was no monitoring for extremity radiation exposure even though it was clearly indicated by some the observed radiation levels (ash receivers). The 1999 DOE Phase II report found that "Paducah failed to monitor radiation to workers internal organs – even though plant managers have been repeatedly warned to do so."<sup>9</sup>

All of the above is why the following statements have been made in the press and worker testimonies: complete lack of health physics; callous disregard; conditions that would never have been tolerated in any other nuclear location; this is Paducah – it doesn't matter here, etc. The evidence clearly shows that at every turn protection of worker health was secondary. The decision to compensate the workers without need for documentation was made in view of all of these health protection failures, coupled with the poor record-keeping and missed exposures that would make dose reconstruction difficult.

Of course, the ultimate proof is in the worker health outcomes and, tragically, an epidemiological study still has not been done on PGDP workers. Recent DOE epidemiological studies at other plants, including Oak Ridge, have shown clearly elevated rates of certain cancers and these plants did not have the abysmal health protection program and high transuranic levels found at Paducah. So it is logical to conclude that worker health suffered. \_\_\_\_\_ has not set out to make a list, but as stories about co-workers have come up in his memoirs, he has noted those who have become sick or died with cancer and pulmonary diseases. Many that he worked with fit into this category and his list has around 50 names on it. Clearly if a study were to be done the results would be overwhelming.

\_\_\_\_\_ was not an innocent bystander. He was in control of this so-called worker protection program. He knew the transuranics were being concentrated up to dangerous levels (by factors of thousands!) and yet, in direct opposition to AEC instructions, issued health physics memos stating that the plant materials were safe enough to eat. He was in charge when decisions were made not to tell the workers about neptunium because they would want hazard pay, not to mandate respirator use, not to monitor extremity or internal organ radiation exposures, and that monitoring for uranium was sufficient to control exposure to transuranics. He was in charge when uranium testing was done on employees. He was in charge when the plant urine uranium limit was increased a whopping 87-fold and when limits were raised for transuranics in the recycle uranium. He was in charge when all of the safety equipment was torn out.

There is a follow-up plant 1961 memo to the above infamous 1960 AEC memo in which \_\_\_\_\_ describes a meeting with AEC ("that he attended as a last minute replacement for Mr. \_\_\_\_\_") where he told AEC that sending workers for neptunium testing would cause "labor relations problems

There is also a 1987 plant report written by \_\_\_\_\_, apparently in response to the 1985 DOE investigation. This report, which describes the plant's position on the transuranics contamination problem, generated great skepticism from the University of Utah experts (Exposure Assessment) and they noted that "many assumptions were made for which the basis was not clear and which could be questioned based on other documentation". For example, \_\_\_\_\_ assumed a particle size of 10 microns for the Paducah Dust but a 1960 plant memo contains the statement that "the dust has a size of 0.5 microns, the worst size biologically speaking" (particle size makes a large difference biologically and in the calculations). Uranium (and transuranic dust) is very heavy and 10-micron particles will not stay in the

<sup>9</sup> *Deficient Monitoring Compounded the Risk*, Washington Post, August 8, 1999

air long (the stuff the workers were breathing had to be much finer). Not surprisingly, \_\_\_\_\_ came to the conclusion that the exposures were not significant. But when the University of Utah experts redid the calculations, using a particle size of 1 micron (traditionally used if the true value is not known) and what they considered to be more reasonable solubility parameters, they concluded that ten percent of the workforce received exposures exceeding regulatory limits.

In a 1975 paper \_\_\_\_\_ presented to a conference of the American Institute of Biological Sciences, after two decades of studies showing highly radioactive dust, he proclaimed that most of the work still to be done on the cascade upgrade "can be done without respirators."<sup>10</sup>

\_\_\_\_\_ is convicted by his own words. When asked the paramount question by the Paducah Sun, about whether the workers were told of the transuranics, he had this to say: "Employees were not lied to about what was in the process. Some people were not told about or trained in handling plutonium or neptunium because it was not in their work area. Others may have been told about it but forgot about it because we didn't stress it."<sup>11</sup> The single most significant issue in the history of the plant and all he can say is that we may have told some of the workers. How many people are just going to forget about it if their employer suddenly tells them they are working with plutonium? This stuff was in everyone's work area and was highly concentrated in C-400, C-410 and C-720 but none of these workers were told.

Not telling the workers about a significant hazard that had serious implications for their health is a lie and is also criminal. Baker should consider himself lucky that charges have not been brought. The deception that the worker health was being protected at the PGDP has gone on for 47 years too long and he needs to move on and make his peace with God because he has a lot to answer for.

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<sup>10</sup> '85 Report Urged Uranium Worker Tests, Louisville Courier-Journal, September 18, 1999

<sup>11</sup> Retired Health Physics Director - No Fraud at Plant, Paducah Sun, October 3, 1999